

What is claimed is:

1 1. A method of manufacturing a rigid internal gear of a wave gear
2 device, in which the rigid internal gear comprises a main gear ring and
3 a tooth-forming ring having internal teeth formed on an inner
4 circumferential surface thereof and, in which the tooth-forming ring is
5 disposed inside the main gear body and integrally bonded thereto,
6 the method comprising steps of:
7 aluminizing an outer circumferential surface of the tooth-
8 forming ring to form an aluminum-dispersed covering layer; and
9 applying enveloped casting to the main gear ring and the
10 tooth-forming ring so as to integrate them.

1 2. A method of manufacturing a rigid internal gear according to
2 Claim 1,
3 wherein fine concaves and convexes are formed in the outer
4 circumferential surface of the tooth-forming ring before the aluminizing
5 step is performed.

1 3. A method of manufacturing a rigid internal gear according to
2 Claim 1 or 2,
3 wherein the enveloped casting is carried out in a condition that
4 the tooth-forming ring is heated to a temperature of at least 150°C.

1 4. A method of manufacturing a rigid internal gear according to any
2 of Claims 1, 2 and 3,
3 wherein the tooth-forming ring is formed of one of ductile cast

4 iron and austenitic spheroidal graphite iron, and the main gear ring is
5 formed of one of aluminum, aluminum alloy, magnesium, and
6 magnesium alloy;

1 5. A method of manufacturing a rigid internal gear according to any
2 of Claims 1 to 4,

3 wherein a thickness of bottom of the tooth-forming ring is set in
4 a range of $1m$ to $5m$, where m is a module of the rigid internal gear .

1 6. A method of manufacturing a rigid internal gear according to any
2 of Claims 1 to 5,

3 further comprising a gear cutting process for forming the
4 internal teeth on the tooth-forming ring, which is carried out after the
5 tooth-forming ring is integrated with the main gear ring.

1 7. A rigid internal gear of a wave gear device manufactured by a
2 method of manufacturing according to any of Claims 1 to 6.

1 8. A method of manufacturing a rigid internal gear of a wave gear
2 device, in which the rigid internal gear comprises a main gear ring and
3 a tooth-forming ring having internal teeth formed on an inner
4 circumferential surface thereof and, in which the tooth-forming ring is
5 disposed inside the main gear body and integrally bonded thereto,

6 the method comprising steps of:

7 forming the main gear ring from a first material that has a low
8 linear expansion coefficient;

9 forming the tooth-forming ring from a second material that has
10 a high linear expansion coefficient; and

11 pressing the tooth-forming ring into an inside of the main gear
12 ring and diffusion-combining the tooth-forming ring and the main gear
13 ring.

1 9. A method of manufacturing a rigid internal gear according to
2 Claim 8,
3 wherein the first material is a titanium alloy with a linear
4 expansion coefficient of approximately 8.8×10^{-6} , and
5 the second material is a ferrous material with a linear expansion
6 coefficient of approximately 12.0×10^{-6} .

1 10. A method of manufacturing a rigid internal gear according to
2 Claim 8,
3 wherein the first material is a ceramic material with a linear
4 expansion coefficient of approximately 7.8×10^{-6} , and
5 the second material is a stainless steel material with a linear
6 expansion coefficient of approximately 17.0×10^{-6} .

1 11. A method of manufacturing a rigid internal gear according to
2 Claim 8,
3 wherein the first material is an aluminum alloy with a linear
4 expansion coefficient in a range of 6.2×10^{-6} to 10.0×10^{-6} , and
5 the second material is an aluminum alloy with a linear expansion
6 coefficient in a range of 20×10^{-6} to 24×10^{-6} .

1 12. A method of manufacturing a rigid internal gear according to any of
2 Claims 8 to 11,
3 wherein an inner circumferential surface of the main gear ring is

4 tapered,

5 an outer circumferential surface of the tooth-forming ring is
6 tapered so that the tooth-forming ring can be pressed into the tapered
7 inner circumferential surface of the main gear ring, and

8 the tooth-forming ring is pressed onto the inner circumferential
9 surface of the main gear ring and the tooth-forming ring and main gear
10 ring are diffusion-bonded together.

1 13. A method of manufacturing a rigid internal gear according to any
2 of Claims 8 to 12;

3 wherein a gear cutting process for forming the internal teeth on
4 the tooth-forming ring is performed after the tooth-forming ring has
5 been joined to the main gear ring to form a single body.

1 14. A rigid internal gear of a wave gear device manufactured by a
2 method of manufacturing according to any of Claims 8 to 13.

1 15. A method of manufacturing a rigid internal gear of a wave gear
2 device, in which the rigid internal gear comprises a main gear ring and
3 a tooth-forming ring having internal teeth formed on an inner
4 circumferential surface thereof and, in which the tooth-forming ring is
5 disposed inside the main gear body and integrally bonded thereto,

6 the method comprising steps of:

7 adding knurls to an outer circumferential surface of the tooth-
8 forming ring and carving, from tops of the knurls, at least one cutting
9 edge that extends in a circumferential direction; and

10 pressing the tooth-forming ring into an inside of the main gear
11 ring while having at least one cutting edge formed on the outer

12 circumferential surface of the tooth-forming ring cut an inner
13 circumferential surface of the main gear ring so as to integrate the main
14 gear ring and the tooth-forming ring.

1 16. A method of manufacturing a rigid internal gear according to
2 Claim 15,

3 wherein the main gear ring is formed from one of an aluminum
4 alloy, a titanium alloy, and a ceramic material, and

5 the tooth-forming ring is formed from one of a ferrous material
6 and a copper material.

1 17. A method of manufacturing a rigid internal gear according to
2 Claim 15 or Claim 16,

3 wherein a gear cutting process for forming the internal teeth on
4 the tooth-forming ring is performed after the tooth-forming ring is
5 integrated with the main gear ring.

1 18. A rigid internal gear of a wave gear device manufactured by a
2 method of manufacturing according to any of Claims 15 to 17.